

Find pairs of values

Notes and guidance

In this small step, children explore equations with two unknown values, recognising that these can have several possible solutions.

Children can use substitution to work out pairs of possible values. For example, if $x + y = 9$, they find the values of y for different values of x . They should work systematically to find all the possible integer values. A table is a good way to support this. In this step, the possible values will always be integers greater than or equal to zero, but this could be extended to negative and decimal values. Begin with simple equations of the form $x + y = \text{_____}$ or $ab = \text{_____}$, before moving on to more complex equations that include multiples of the unknowns, for example $2x + 3y = \text{_____}$

It is important that children understand that they cannot know the exact value of the two unknowns, as they do not have enough information.

Things to look out for

- Children may not consider zero as a possible value for one of the unknowns.
- Children may need support to work systematically to find all possible solutions.

Key questions

- What two numbers could add together to make _____?
- What could the values of x and y be in the equation _____?
- Why are there several possible answers for this question?
- Have you found all the possible pairs of values?
How do you know?
- In the equation _____, if $x = \text{_____}$, what must the value of y be? If x is a different value, does y also change?
- How can you draw a bar model to represent the equation _____?

Possible sentence stems

- In the equation $x + y = \text{_____}$, if $x = \text{_____}$ then $y = \text{_____}$
- If the product of p and q is _____, then p could be _____ and q could be _____

National Curriculum links

- Find pairs of numbers that satisfy an equation with two unknowns
- Enumerate possibilities of combinations of two variables

Find pairs of values

Key learning

- x and y are both whole numbers.

$$x + y = 5$$

Ann creates a table to work out the possible sets of values of x and y .

x	y	$x + y$
0	5	5
		5
		5
		5
		5
		5

Work systematically to complete Ann's table.

- a and b are both whole numbers.

$$a \times b = 24$$

Create a table to show all the possible sets of values for a and b .

- p and q are both whole numbers less than 12

$$p - q = 3$$

Find all the possible values of p and q .

- x and y are both whole numbers.

$$x > y$$

$$x + y = 25$$

- ▶ If x is odd and y is even, what are the possible pairs of values for x and y ?
- ▶ If x and y are both even, what are the possible pairs of values for x and y ?
- ▶ If x is a multiple of 5 and y is even, what are the possible pairs of values for x and y ?

Create your own problem like this for a partner.

- a and b are integers.

$$3a + 2b = 20$$

Work out three possible pairs of values for a and b .

Compare methods with a partner.

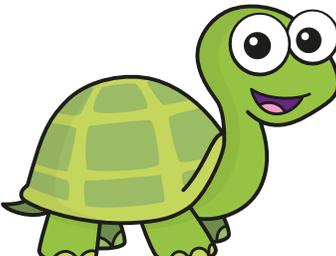
Find pairs of values

Reasoning and problem solving

a and b are both whole numbers.

$ab + b = 18$

a and b
must both be
odd numbers.



Is Tiny correct?
Explain your answer.

No

a , b and c are integers between 0 and 5

$a + b = 6$

$b + c = 4$

Find the values of a , b and c .
How many possibilities can you find?

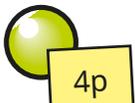
- $a = 2, b = 4, c = 0$
- $a = 3, b = 3, c = 1$
- $a = 4, b = 2, c = 2$
- $a = 5, b = 1, c = 3$

Large beads costs 5p and small beads cost 4p.

Sam spends 79p on beads.

What possible combinations of large beads (l) and small beads (s) could she buy?

Write each possible combination as an expression.

- $3l + 16s$
- $7l + 11s$
- $11l + 6s$
- $15l + s$